

SOLAR/1038-79/04

# Monthly Performance Report

SADDLE HILL TRUST

LOT 36

APRIL 1979



## U.S. Department of Energy

National Solar Heating and  
Cooling Demonstration Program

National Solar Data Program

#### NOTICE

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Department of Energy, nor any of their employees, nor any of their contractors, subcontractors, or their employees, make any warranty, express or implied, or assume any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.

## MONTHLY PERFORMANCE REPORT

### SADDLE HILL TRUST LOT 36

APRIL 1979

#### I. SYSTEM DESCRIPTION

Saddle Hill Trust Lot 36 is a single-family residence in Medway, Massachusetts. Solar energy is used for space heating the home and preheating domestic hot water (DHW). The system has an array of flat-plate collectors with a gross area of 315 square feet. The array faces south at an angle of 58 degrees to the horizontal. A 60 percent glycerol solution is the transfer medium that delivers solar energy from the collector array to storage; water is the transfer medium that delivers solar energy from storage to the space heating and hot water loads. Solar energy is stored in the basement in a 750-gallon storage tank. The tank is made of steel and lined with polyurethane. Preheated city water is supplied, on demand, to a conventional 80-gallon DHW tank. When solar energy is insufficient to satisfy the space heating load, an oil furnace provides auxiliary energy for space heating. Similarly, a conventional electric 80-gallon DHW heater provides auxiliary energy for water heating. The system, shown schematically in Figure 1, has three modes of solar operation.

Mode 1 - Collector-to-Storage: This mode activates when the collector temperature is either more than 40°F higher than storage temperature or higher than 150°F. Pump P1 is on. Solar energy transfer takes place through a heat exchanger located inside the storage tank.

Mode 2 - Storage-to-Space Heating: This mode activates when there is a demand for space heating, storage temperature is 70°F or higher, and house temperature is lower than storage temperature. Pump P3 is on. Solar energy transfer takes place through a heat exchanger located inside the air duct.

Mode 3 - Storage-to-DHW Tank: This mode activates when storage water is 5°F higher than water in the DHW tank. Pump P2 is on. Solar energy transfer takes place through a heat exchanger located inside the DHW heater.

#### II. PERFORMANCE EVALUATION

##### INTRODUCTION

The site was occupied in April and the solar energy system operated continuously during the month. Solar energy satisfied 69 percent of the DHW requirements and 20 percent of the space heating requirements. The solar energy system provided an electrical energy savings of 2.1 million Btu and fossil fuel energy savings of 1.8 million Btu.

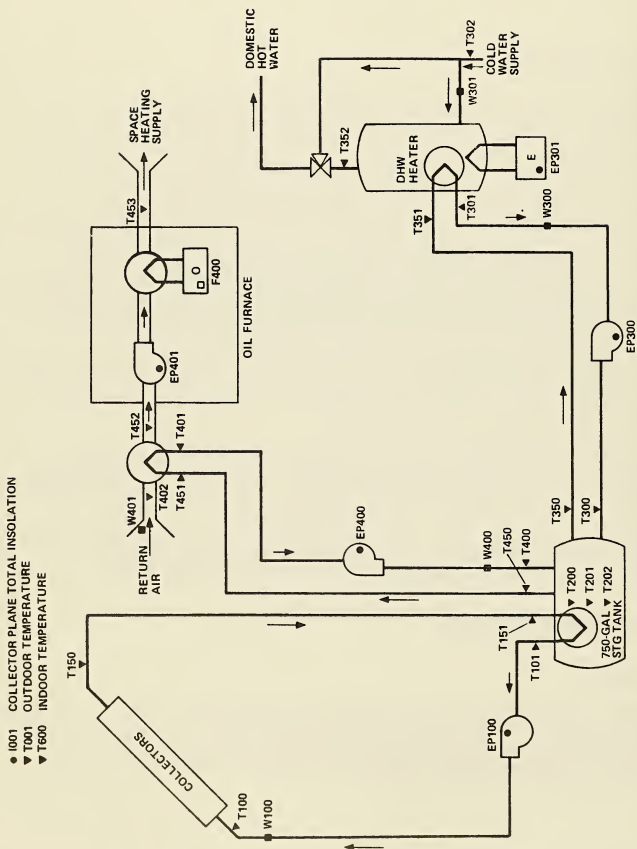


Figure 1. SADDLE HILL TRUST, LOT NO. 36, SOLAR ENERGY SYSTEM SCHEMATIC

## WEATHER CONDITIONS

During the month, total incident solar energy on the collector array was 11.1 million Btu for a daily average of 1178 Btu per square foot. This was below the estimated average daily solar radiation for this geographical area during April of 1230 Btu per square foot for a south-facing plane with a tilt of 58 degrees to the horizontal. The average ambient temperature during April was 47°F as compared with the long-term average for April of 49°F. The number of heating degree-days for the month (based on a 65°F reference) was 546, as compared with the long-term average of 492.

## THERMAL PERFORMANCE

System - During April the solar energy system performed somewhat poorer than expected. The expected performance was determined from a modified f-chart analysis using measured weather and subsystem loads as inputs. Solar energy collected was 4.3 million Btu versus an estimated 5.2 million Btu. Solar energy used by the system was estimated by assuming that all energy collected would be applied to the load. Actual solar energy used was 3.4 million Btu. System total solar fraction was 30 percent versus an estimated 59 percent.

Collector - The total incident solar radiation on the collector array for the month of April was 11.1 million Btu. During the period the collector loop was operating, the total insolation amounted to 8.6 million Btu. The total collected solar energy for the month of April was 4.3 million Btu, resulting in a collector array efficiency of 38 percent, based on total incident insolation. Solar energy delivered from the collector array to storage was 4.3 million Btu. There was no measured energy loss during transfer from the collector array to storage. Operating energy required by the collector loop was 0.098 million Btu.

Storage - Solar energy delivered to storage was 4.3 million Btu. There were 3.4 million Btu delivered from storage to the DHW and space heating subsystems. Energy loss from storage was 0.62 million Btu. This loss represented 14 percent of the energy delivered to storage. The storage efficiency was 86 percent: This is calculated as the ratio of the sum of the energy removed from storage and the change in stored energy, to the energy delivered to storage. The average storage temperature for the month was 115°F.

DHW Load - The DHW subsystem consumed 2.4 million Btu of solar energy and 1.0 million Btu of auxiliary electrical energy to satisfy a hot water load of 1.2 million Btu. The solar fraction of this load was 69 percent. Losses from the DHW subsystem were 2.2 million Btu. The DHW subsystem consumed a total of 0.17 million Btu of operating energy, resulting in an electrical energy savings of 2.2 million Btu. A daily average of 53 gallons of DHW were consumed at an average temperature of 138°F delivered from the tank.

Space Heating Load - The space heating subsystem consumed 1.1 million Btu of solar energy and 7.0 million Btu of auxiliary fossil fuel energy to satisfy a space heating load of 5.3 million Btu. The solar fraction of this load was

20 percent. The space heating subsystem consumed a total of 1.8 million Btu of operating energy, resulting in an electrical energy expense of 0.020 million Btu.

#### OBSERVATIONS

The DHW loop was on continuously throughout the month. This was a prime contributor to the 2.2 million Btu energy loss in the DHW system.

#### ENERGY SAVINGS

The solar energy system provided a net electrical energy savings of 2.1 million Btu and a fossil fuel energy savings of 1.8 million Btu. The DHW subsystem provided an electrical energy savings of 2.2 million Btu, while the space heating subsystem provided a fossil fuel energy savings of 1.8 million Btu and incurred an electrical energy expense of 0.020 million Btu.

#### III. ACTION STATUS

The system designer is investigating DHW subsystem operation.

# SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

## MONTHLY REPORT SITE SUMMARY

SITE: SADDLE HILL TRUST LOT 36, MEDWAY, MA  
REPORT PERIOD: APRIL 1979

SOLAR/1024-79/04

### SITE/SYSTEM DESCRIPTION:

THE SADDLE HILL TRUST LOT #36 SOLAR ENERGY SYSTEM PROVIDES SPACE HEATING AND HOT WATER FOR A SINGLE FAMILY RESIDENCE. THE COLLECTOR IS A 14 PANEL LIQUID COLLECTOR. STORAGE IS A 750 GALLON WATER TANK LOCATED IN THE BASEMENT. AUXILIARY HEATING IS PROVIDED BY A 140,000 BTU/HR OIL FURNACE AND AUXILIARY HOT WATER BY A 14,676 BTU/HR ELECTRIC DOMESTIC HOT WATER HEATER.

### GENERAL SITE DATA:

INCIDENT SOLAR ENERGY  
COLLECTED SOLAR ENERGY  
AVERAGE AMBIENT TEMPERATURE  
AVERAGE BUILDING TEMPERATURE  
ECSS SOLAR CONVERSION EFFICIENCY  
ECSS OPERATING ENERGY  
TOTAL SYSTEM OPERATING ENERGY  
TOTAL ENERGY CONSUMED

11.135 MILLION BTU  
35350 BTU/SQ.FT.  
4.269 MILLION BTU  
13551 BTU/SQ.FT.  
47 DEGREES F  
70 DEGREES F  
0.31  
0.098 MILLION BTU  
2.035 MILLION BTU  
14.277 MILLION BTU

### SUBSYSTEM SUMMARY:

LOAD  
SOLAR FRACTION  
SOLAR ENERGY USED  
OPERATING ENERGY  
AUX. THERMAL ENERGY  
AUX. ELECTRIC FUEL  
AUX. FOSSIL FUEL  
ELECTRICAL SAVINGS  
FOSSIL SAVINGS

HOT WATER  
1.246  
2.357  
0.171  
1.001  
1.001  
N.A.  
2.185  
N.A.

HEATING  
5.256  
20  
1.072  
1.766  
4.184  
N.A.  
6.973  
-0.020  
1.787

COOLING  
N.A.  
N.A.  
N.A.  
N.A.  
N.A.  
N.A.  
N.A.  
N.A.  
N.A.

SYSTEM TOTAL  
6.497 MILLION BTU  
30 PERCENT  
3.429 MILLION BTU  
2.075 MILLION BTU  
5.184 MILLION BTU  
1.091 MILLION BTU  
6.973 MILLION BTU  
2.067 MILLION BTU  
1.787 MILLION BTU

### SYSTEM PERFORMANCE FACTOR:

0.380

\* DENOTES UNAVAILABLE DATA

@ DENOTES NULL DATA

N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT  
OF THE NATIONAL SOLAR DATA PROGRAM, FEBRUARY 28, 1978.  
SOLAR/0004-78/18

# SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

## MONTHLY REPORT SITE SUMMARY

SITE: SADDLE HILL TRUST LOT 36, MEDWAY, MA  
REPORT PERIOD: APRIL, 1979

SOLAR/1024-79/04

### SITE/SYSTEM DESCRIPTION:

THE SADDLE HILL TRUST LOT #36 SOLAR ENERGY SYSTEM PROVIDES SPACE HEATING AND HOT WATER FOR A SINGLE FAMILY RESIDENCE. THE COLLECTOR IS A 14 PANEL LIQUID COLLECTOR. STORAGE IS 75 GALLON WATER TANK LOCATED IN THE BASEMENT. AUXILIARY HEATING IS PROVIDED BY A 140,000 BTU/HR OIL FURNACE AND AUXILIARY HOT WATER BY A 14,676 BTU/HR ELECTRIC DOMESTIC HOT WATER HEATER.

### GENERAL SITE DATA:

INCIDENTAL SOLAR ENERGY

COLLECTED SOLAR ENERGY

AVERAGE AMBIENT TEMPERATURE  
AVERAGE BUILDING TEMPERATURE  
ECSS SOLAR CONVERSION EFFICIENCY  
ECSS OPERATING ENERGY  
TOTAL SYSTEM OPERATING ENERGY  
TOTAL ENERGY CONSUMED

11.748 GIGA JOULES  
401430 KJ/SQ.M.  
4.503 GIGA JOULES  
153885 KJ/SQ.M.  
8 DEGREES C  
21 DEGREES C  
0.31  
0.103 GIGA JOULES  
2.146 GIGA JOULES  
15.062 GIGA JOULES

### SUBSYSTEM SUMMARY:

LOAD  
SOLAR FRACTION  
SOLAR ENERGY USED  
OPERATING ENERGY  
AUX. THERMAL ENG  
AUX. ELECTRIC FUEL  
AUX. FOSSIL FUEL  
ELECTRICAL SAVINGS  
FOSSIL SAVINGS

HEATING  
5.545  
1.131  
1.863  
4.414  
N.A.  
7.356  
-0.022  
1.885

COOLING  
N.A.  
N.A.  
N.A.  
N.A.  
N.A.  
N.A.  
N.A.  
N.A.

SYSTEM TOTAL  
6.854 GIGA JOULES  
30 PERCENT  
3.617 GIGA JOULES  
2.146 GIGA JOULES  
5.470 GIGA JOULES  
1.056 GIGA JOULES  
7.356 GIGA JOULES  
2.181 GIGA JOULES  
1.885 GIGA JOULES

### SYSTEM PERFORMANCE FACTOR:

0.380

\* DENOTES UNAVAILABLE DATA  
@ DENOTES NULL DATA  
N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT  
OF THE NATIONAL SOLAR DATA PROGRAM, FEBRUARY 28, 1978,  
SOLAR/0004-78/18

# SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

## MONTHLY REPORT ENERGY COLLECTION AND STORAGE SUBSYSTEM (ECSS)

SITE: SADDLE HILL TRUST LOT 36, MEDWAY, MA  
REPORT PERIOD: APRIL, 1979

SOLAR/1024-79/04

| DAY<br>OF<br>MONTH | INCIDENT<br>SOLAR<br>ENERGY<br>MILLION<br>BTU | AMBIENT<br>TEMP<br>DEG-F | ENERGY<br>TO<br>LOADS<br>MILLION<br>BTU | AUX<br>THERMAL<br>TO ECSS<br>MILLION<br>BTU | ECSS<br>OPERATING<br>ENERGY<br>MILLION<br>BTU | ECSS<br>ENERGY<br>REJECTED<br>MILLION<br>BTU | ECSS SOLAR<br>CONVERSION<br>EFFICIENCY |
|--------------------|---|--------------------------|---|---|---|--|--|
| 1                  | 0.111   | 44                       | 0.038                                   | N   | 0.001   | N  | 0.348                                  |
| 2                  | 0.033   | 38                       | 0.042                                   | O   | 0.000   | O  | 1.274                                  |
| 3                  | 0.097   | 41                       | 0.030                                   | T   | 0.001   | T  | 0.313                                  |
| 4                  | 0.299   | 40                       | 0.056                                   |   | 0.004   |  | 0.187                                  |
| 5                  | 0.100   | 40                       | 0.042                                   | A   | 0.000   | A  | 0.415                                  |
| 6                  | 0.404   | 38                       | 0.053                                   | P   | 0.004   | P  | 0.130                                  |
| 7                  | 0.343   | 35                       | 0.058                                   | P   | 0.003   | P  | 0.169                                  |
| 8                  | 0.722   | 38                       | 0.217                                   | L   | 0.005   | L  | 0.301                                  |
| 9                  | 0.041   | 34                       | 0.104                                   | I   | 0.000   | I  | 2.542                                  |
| 10                 | 0.263   | 38                       | 0.064                                   | C   | 0.003   | C  | 0.245                                  |
| 11                 | 0.717   | 44                       | 0.152                                   | A   | 0.006   | A  | 0.212                                  |
| 12                 | 0.612   | 48                       | 0.226                                   | B   | 0.004   | B  | 0.369                                  |
| 13                 | 0.551   | 43                       | 0.311                                   | L   | 0.006   | L  | 0.565                                  |
| 14                 | 0.074   | 38                       | 0.311                                   | E   | 0.000   | E  | 1.765                                  |
| 15                 | 0.148   | 41                       | 0.054                                   |   | 0.000   |  | 0.366                                  |
| 16                 | 0.110   | 41                       | 0.036                                   |   | 0.000   |  | 0.330                                  |
| 17                 | 0.343   | 43                       | 0.046                                   |   | 0.004   |  | 0.134                                  |
| 18                 | 0.505   | 46                       | 0.122                                   |   | 0.006   |  | 0.242                                  |
| 19                 | 0.406   | 44                       | 0.154                                   |   | 0.004   |  | 0.379                                  |
| 20                 | 0.597   | 47                       | 0.153                                   |   | 0.006   |  | 0.257                                  |
| 21                 | 0.667   | 50                       | 0.212                                   |   | 0.005   |  | 0.318                                  |
| 22                 | 0.393   | 52                       | 0.247                                   |   | 0.004   |  | 0.630                                  |
| 23                 | 0.632   | 63                       | 0.133                                   |   | 0.006   |  | 0.211                                  |
| 24                 | 0.642   | 60                       | 0.131                                   |   | 0.005   |  | 0.205                                  |
| 25                 | 0.389   | 62                       | 0.115                                   |   | 0.003   |  | 0.296                                  |
| 26                 | 0.373   | 63                       | 0.117                                   |   | 0.003   |  | 0.314                                  |
| 27                 | *   | *                        | *                                       |   | *   |  | *                                      |
| 28                 | 0.419   | 64                       | 0.105                                   |   | 0.005   |  | 0.252                                  |
| 29                 | 0.234   | 59                       | 0.064                                   |   | 0.002   |  | 0.275                                  |
| 30                 | 0.541   | 65                       | 0.098                                   |   | 0.006   |  | 0.181                                  |
| SUM                | 11.135  | -                        | 3.429                                   | N.A.  | 0.098   | N.A.   | -                                      |
| AVG                | 0.371   | 47                       | 0.114                                   | N.A.  | 0.003   | N.A.   | 0.308                                  |
| NBS ID             | 0001  | N113                     |   |   | 0102  |  | N111                                   |

\* DENOTES UNAVAILABLE DATA.

@ DENOTES NULL DATA.

N.A. DENOTES NOT APPLICABLE DATA.

# SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

## MONTHLY REPORT COLLECTOR ARRAY PERFORMANCE

SITE: SADDLE HILL TRUST LOT 36, MEDWAY, MA SOLAR/1024-79/04  
REPORT PERIOD: APRIL, 1979

| DAY<br>OF<br>MONTH | INCIDENT<br>SOLAR<br>ENERGY<br>MILLION<br>BTU | OPERATIONAL<br>INCIDENT<br>ENERGY<br>MILLION<br>BTU | COLLECTED<br>SOLAR<br>ENERGY<br>MILLION<br>BTU | DAYTIME<br>AMBIENT<br>TEMP<br>DEG F | COLLECTOR<br>ARRAY<br>EFFICIENCY |
|--------------------|---|---|--|-------------------------------------|----------------------------------|
| 1                  | 0.111   | 0.036   | 0.016  | 45                                  | 0.142                            |
| 2                  | 0.033   | 0.009   | 0.000  | 38                                  | 0.000                            |
| 3                  | 0.097   | 0.025   | 0.011  | 45                                  | 0.111                            |
| 4                  | 0.299   | 0.243   | 0.124  | 49                                  | 0.415                            |
| 5                  | 0.100   | 0.011   | 0.009  | 42                                  | 0.086                            |
| 6                  | 0.404   | 0.320   | 0.167  | 44                                  | 0.413                            |
| 7                  | 0.343   | 0.207   | 0.093  | 38                                  | 0.270                            |
| 8                  | 0.722   | 0.647   | 0.330  | 42                                  | 0.456                            |
| 9                  | 0.041   | 0.000   | 0.000  | 34                                  | 0.000                            |
| 10                 | 0.263   | 0.150   | 0.056  | 42                                  | 0.212                            |
| 11                 | 0.717   | 0.651   | 0.343  | 51                                  | 0.479                            |
| 12                 | 0.612   | 0.542   | 0.267  | 57                                  | 0.436                            |
| 13                 | 0.551   | 0.493   | 0.251  | 53                                  | 0.456                            |
| 14                 | 0.074   | 0.000   | 0.000  | 40                                  | 0.000                            |
| 15                 | 0.148   | 0.009   | 0.004  | 45                                  | 0.028                            |
| 16                 | 0.110   | 0.000   | 0.000  | 46                                  | 0.000                            |
| 17                 | 0.343   | 0.254   | 0.138  | 52                                  | 0.404                            |
| 18                 | 0.505   | 0.432   | 0.204  | 53                                  | 0.403                            |
| 19                 | 0.406   | 0.322   | 0.158  | 54                                  | 0.388                            |
| 20                 | 0.597   | 0.522   | 0.259  | 59                                  | 0.434                            |
| 21                 | 0.667   | 0.585   | 0.307  | 67                                  | 0.461                            |
| 22                 | 0.393   | 0.274   | 0.127  | 65                                  | 0.324                            |
| 23                 | 0.632   | 0.592   | 0.310  | 71                                  | 0.492                            |
| 24                 | 0.642   | 0.535   | 0.269  | 71                                  | 0.419                            |
| 25                 | 0.389   | 0.257   | 0.120  | 74                                  | 0.309                            |
| 26                 | 0.373   | 0.216   | 0.098  | 73                                  | 0.263                            |
| 27                 | *   | *   | *  | *                                   | *                                |
| 28                 | 0.419   | 0.360   | 0.169  | 73                                  | 0.403                            |
| 29                 | 0.234   | 0.113   | 0.067  | 65                                  | 0.285                            |
| 30                 | 0.541   | 0.470   | 0.231  | *                                   | 0.427                            |
| SUM                | 11.135  | 8.550   | 4.269  | -                                   | -                                |
| AVG                | 0.371   | 0.285   | 0.142  | 52                                  | 0.383                            |
| NBSID              | Q001  |   | Q100   |                                     | N100                             |

\* DENOTES UNAVAILABLE DATA.

@ DENOTES NULL DATA.

N.A. DENOTES NOT APPLICABLE DATA.

# SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

## MONTHLY REPORT STORAGE PERFORMANCE

SITE: SADDLE HILL TRUST LOT 36, MEDWAY, MA SOLAR/1024-79/04  
REPORT PERIOD: APRIL, 1979

| DAY<br>OF<br>MONTH | ENERGY<br>TO<br>STORAGE<br>MILLION<br>BTU | ENERGY<br>FROM<br>STORAGE<br>MILLION<br>BTU | CHANGE<br>IN STORED<br>ENERGY<br>MILLION<br>BTU | STORAGE<br>AVERAGE<br>TEMP<br>DEG F | STORAGE<br>EFFICIENCY |
|--------------------|---|---|---|-------------------------------------|-----------------------|
| 1                  | 0.017                                     | 0.038                                       | -0.022  | 93                                  | 1.006                 |
| 2                  | 0.000                                     | 0.042                                       | -0.033  | 89                                  | 1.000                 |
| 3                  | 0.013                                     | 0.030                                       | -0.015  | 85                                  | 1.218                 |
| 4                  | 0.124                                     | 0.056                                       | 0.053   | 89                                  | 0.880                 |
| 5                  | -0.001                                    | 0.042                                       | -0.028  | 90                                  | -17.524               |
| 6                  | 0.172                                     | 0.053                                       | 0.097   | 95                                  | 0.866                 |
| 7                  | 0.088                                     | 0.058                                       | 0.012   | 105                                 | 0.798                 |
| 8                  | 0.325                                     | 0.217                                       | 0.079   | 120                                 | 0.911                 |
| 9                  | 0.000                                     | 0.104                                       | -0.089  | 109                                 | 1.000                 |
| 10                 | 0.060                                     | 0.064                                       | -0.010  | 103                                 | 0.893                 |
| 11                 | 0.343                                     | 0.152                                       | 0.147   | 119                                 | 0.872                 |
| 12                 | 0.271                                     | 0.126                                       | 0.032   | 126                                 | 0.949                 |
| 13                 | 0.253                                     | 0.311                                       | -0.073  | 125                                 | 0.941                 |
| 14                 | 0.000                                     | 0.131                                       | -0.109  | 109                                 | 1.000                 |
| 15                 | 0.005                                     | 0.054                                       | -0.044  | 98                                  | 2.018                 |
| 16                 | 0.000                                     | 0.036                                       | -0.032  | 92                                  | 1.000                 |
| 17                 | 0.144                                     | 0.046                                       | 0.071   | 96                                  | 0.814                 |
| 18                 | 0.213                                     | 0.122                                       | 0.064   | 110                                 | 0.873                 |
| 19                 | 0.164                                     | 0.154                                       | -0.000  | 114                                 | 0.935                 |
| 20                 | 0.266                                     | 0.153                                       | 0.087   | 122                                 | 0.907                 |
| 21                 | 0.311                                     | 0.212                                       | 0.062   | 130                                 | 0.882                 |
| 22                 | 0.132                                     | 0.247                                       | -0.108  | 124                                 | 1.056                 |
| 23                 | 0.320                                     | 0.133                                       | 0.174   | 137                                 | 0.960                 |
| 24                 | 0.274                                     | 0.131                                       | 0.070   | 148                                 | 0.737                 |
| 25                 | 0.115                                     | 0.115                                       | -0.030  | 151                                 | 0.747                 |
| 26                 | 0.095                                     | 0.117                                       | -0.043  | 144                                 | 0.783                 |
| 27                 | *   | *   | -0.134  | *                                   | *                     |
| 28                 | 0.178                                     | 0.105                                       | 0.040   | 131                                 | 0.817                 |
| 29                 | 0.054                                     | 0.064                                       | -0.030  | 130                                 | 0.631                 |
| 30                 | 0.244                                     | 0.098                                       | 0.087   | 137                                 | 0.755                 |
| SUM                | 4.325                                     | 3.429                                       | 0.275   | -                                   | -                     |
| AVG                | 0.144                                     | 0.114                                       | 0.009   | 115                                 | 0.856                 |
| NBS ID             | Q200                                      | Q201  | Q202  | -                                   | N108                  |

\* DENOTES UNAVAILABLE DATA.

@ DENOTES NULL DATA.

N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM  
MONTHLY REPORT  
HOT WATER SUBSYSTEM

SITE: SADDLE HILL TRUST LOT 36, MEDWAY, MA  
REPORT PERIOD: APRIL, 1979

SOLAR/1024-79/04

| DAY<br>OF<br>MON. | HOT<br>WATER<br>LOAD<br>MILLION<br>BTU | SOLAR<br>FR.OF<br>LOAD<br>PER<br>CENT | SOLAR<br>ENERGY<br>USED<br>MILLION<br>BTU | OPER<br>ENERGY<br>MILLION<br>BTU | AUX<br>THERMAL<br>USED<br>MILLION<br>BTU | AUX<br>ELECT<br>FUEL<br>MILLION<br>BTU | AUX<br>FOSSIL<br>FUEL<br>MILLION<br>BTU | ELECT<br>ENERGY<br>SAVINGS<br>MILLION<br>BTU | FOSSIL<br>ENERGY<br>SAVINGS<br>MILLION<br>BTU | SUP.<br>WAT.<br>TEMP<br>DEG<br>F | HOT<br>WAT.<br>TEMP<br>DEG<br>F | HOT<br>WATER<br>USED<br>GAL |
|-------------------|--|---------------------------------------|---|----------------------------------|--|--|---|--|---|----------------------------------|---------------------------------|-----------------------------|
| 1                 | 0.026                                  | 47                                    | 0.038                                     | 0.006                            | 0.047                                    | 0.047                                  | N                                       | 0.033  | N   | 59                               | 139                             | 35                          |
| 2                 | 0.043                                  | 42                                    | 0.042                                     | 0.006                            | 0.061                                    | 0.061                                  | Q                                       | 0.056  | Q   | 50                               | 143                             | 52                          |
| 3                 | 0.018                                  | 35                                    | 0.030                                     | 0.005                            | 0.055                                    | 0.055                                  | T                                       | 0.025  | T   | 51                               | 139                             | 24                          |
| 4                 | 0.040                                  | 41                                    | 0.056                                     | 0.006                            | 0.071                                    | 0.071                                  | A                                       | 0.050  | A   | 49                               | 142                             | 52                          |
| 5                 | 0.043                                  | 44                                    | 0.042                                     | 0.006                            | 0.055                                    | 0.055                                  | P                                       | 0.036  | P   | 50                               | 142                             | 53                          |
| 6                 | 0.050                                  | 43                                    | 0.053                                     | 0.006                            | 0.060                                    | 0.060                                  | P                                       | 0.047  | P   | 49                               | 143                             | 61                          |
| 7                 | 0.045                                  | 53                                    | 0.058                                     | 0.006                            | 0.043                                    | 0.043                                  | P                                       | 0.052  | P   | 51                               | 142                             | 56                          |
| 8                 | 0.056                                  | 75                                    | 0.122                                     | 0.006                            | 0.032                                    | 0.032                                  | L                                       | 0.117  | L   | 52                               | 139                             | 74                          |
| 9                 | 0.037                                  | 68                                    | 0.062                                     | 0.006                            | 0.039                                    | 0.039                                  | I                                       | 0.056  | I   | 49                               | 140                             | 46                          |
| 10                | 0.038                                  | 58                                    | 0.064                                     | 0.006                            | 0.046                                    | 0.046                                  | C                                       | 0.059  | C   | 53                               | 136                             | 51                          |
| 11                | 0.032                                  | 74                                    | 0.105                                     | 0.006                            | 0.034                                    | 0.034                                  | A                                       | 0.099  | A   | 48                               | 139                             | 39                          |
| 12                | 0.030                                  | 72                                    | 0.107                                     | 0.006                            | 0.023                                    | 0.023                                  | B                                       | 0.101  | B   | 52                               | 139                             | 39                          |
| 13                | 0.023                                  | 86                                    | 0.073                                     | 0.005                            | 0.023                                    | 0.023                                  | L                                       | 0.067  | L   | 53                               | 128                             | 29                          |
| 14                | 0.058                                  | 67                                    | 0.070                                     | 0.006                            | 0.049                                    | 0.049                                  | E                                       | 0.064  | E   | 51                               | 134                             | 75                          |
| 15                | 0.052                                  | 54                                    | 0.054                                     | 0.006                            | 0.048                                    | 0.048                                  |   | 0.048  |   | 47                               | 137                             | 65                          |
| 16                | 0.043                                  | 50                                    | 0.036                                     | 0.006                            | 0.044                                    | 0.044                                  |   | 0.031  |   | 46                               | 143                             | 57                          |
| 17                | 0.040                                  | 48                                    | 0.046                                     | 0.005                            | 0.044                                    | 0.044                                  |   | 0.040  |   | 53                               | 130                             | 55                          |
| 18                | 0.022                                  | 58                                    | 0.060                                     | 0.006                            | 0.029                                    | 0.029                                  |   | 0.055  |   | 53                               | 134                             | 45                          |
| 19                | 0.035                                  | 68                                    | 0.096                                     | 0.006                            | 0.044                                    | 0.044                                  |   | 0.090  |   | 48                               | 139                             | 28                          |
| 20                | 0.057                                  | 69                                    | 0.104                                     | 0.006                            | 0.041                                    | 0.041                                  |   | 0.098  |   | 49                               | 141                             | 72                          |
| 21                | 0.025                                  | 81                                    | 0.072                                     | 0.005                            | 0.005                                    | 0.005                                  |   | 0.067  |   | 54                               | 136                             | 32                          |
| 22                | 0.066                                  | 85                                    | 0.124                                     | 0.006                            | 0.034                                    | 0.034                                  |   | 0.118  |   | 49                               | 140                             | 109                         |
| 23                | 0.042                                  | 92                                    | 0.133                                     | 0.006                            | 0.003                                    | 0.003                                  |   | 0.127  |   | 53                               | 137                             | 54                          |
| 24                | 0.052                                  | 96                                    | 0.131                                     | 0.006                            | 0.004                                    | 0.004                                  |   | 0.125  |   | 54                               | 135                             | 74                          |
| 25                | 0.042                                  | 99                                    | 0.115                                     | 0.006                            | 0.000                                    | 0.000                                  |   | 0.109  |   | 53                               | 144                             | 50                          |
| 26                | 0.049                                  | 100                                   | 0.117                                     | 0.006                            | 0.000                                    | 0.000                                  |   | 0.111  |   | 55                               | 138                             | 64                          |
| 27                | *                                      | *                                     | *   | *                                | *  | *                                      |   | *  |   | *                                | *                               | *                           |
| 28                | 0.054                                  | 89                                    | 0.105                                     | 0.006                            | 0.013                                    | 0.013                                  |   | 0.100  |   | 55                               | 130                             | 73                          |
| 29                | 0.016                                  | 83                                    | 0.064                                     | 0.006                            | 0.015                                    | 0.015                                  |   | 0.059  |   | 51                               | 141                             | 21                          |
| 30                | 0.049                                  | 90                                    | 0.098                                     | 0.006                            | 0.004                                    | 0.004                                  |   | 0.092  |   | 55                               | 136                             | 65                          |
| SUM               | 1.246                                  | -                                     | 2.357                                     | 0.171                            | 1.001                                    | 1.001                                  | N.A.                                    | 2.185  | N.A.  | -                                | -                               | 1596                        |
| AVG               | 0.042                                  | 69                                    | 0.079                                     | 0.006                            | 0.033                                    | 0.033                                  | N.A.                                    | 0.073  | N.A.  | 52                               | 138                             | 53                          |
| NBS               | Q302                                   | N300                                  | Q300                                      | Q303                             | Q301                                     | Q305                                   | Q306                                    | Q311   | Q313  | N305                             | N307                            | N308                        |

\* DENOTES UNAVAILABLE DATA.  
Q DENOTES NULL DATA.  
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT  
SPACE HEATING SUBSYSTEM

MEDWAY, MA

SOLAR/1024-79/04

SITE: SADDLE HILL TRUST LOT #6, MEDWAY, MA  
REPORT PERIOD: APRIL, 1979

| DAY OF MON. | SPACE HEATING LOAD MILLION BTU | SOLAR FR. OF LOAD PCT | SOLAR ENERGY USED MILLION BTU | OPER ENERGY MILLION BTU | AUX THERMAL USED MILLION BTU | AUX ELECT FUEL MILLION BTU | AUX FOSSIL FUEL MILLION BTU | ELECT ENERGY SAVINGS MILLION BTU | FOSSIL ENERGY SAVINGS MILLION BTU | BLDG TEMP DEG. F | AMB TEMP DEG. F |
|-------------|--------------------------------|-----------------------|-------------------------------|-------------------------|------------------------------|----------------------------|-----------------------------|----------------------------------|-----------------------------------|------------------|-----------------|
| 1           | 0.178                          | 0                     | 0.000                         | 0.043                   | 0.178                        | NOT                        | 0.237                       | 0.000                            | 0.000                             | 68               | 44              |
| 2           | 0.334                          | 0                     | 0.000                         | 0.082                   | 0.334                        |                            | 0.506                       | 0.000                            | 0.000                             | 70               | 38              |
| 3           | 0.334                          | 0                     | 0.000                         | 0.082                   | 0.334                        |                            | 0.506                       | 0.000                            | 0.000                             | 71               | 41              |
| 4           | 0.164                          | 0                     | 0.000                         | 0.042                   | 0.164                        |                            | 0.274                       | 0.000                            | 0.000                             | 67               | 40              |
| 5           | 0.199                          | 0                     | 0.000                         | 0.048                   | 0.199                        |                            | 0.331                       | 0.000                            | 0.000                             | 68               | 40              |
| 6           | 0.272                          | 0                     | 0.000                         | 0.065                   | 0.272                        |                            | 0.454                       | 0.000                            | 0.000                             | 67               | 38              |
| 7           | 0.384                          | 0                     | 0.000                         | 0.090                   | 0.384                        |                            | 0.641                       | 0.000                            | 0.000                             | 67               | 35              |
| 8           | 0.245                          | 39                    | 0.000                         | 0.097                   | 0.150                        |                            | 0.251                       | -0.002                           | 0.000                             | 68               | 38              |
| 9           | 0.361                          | 12                    | 0.043                         | 0.109                   | 0.318                        |                            | 0.530                       | -0.001                           | 0.071                             | 69               | 34              |
| 10          | 0.267                          | 0                     | 0.000                         | 0.065                   | 0.267                        |                            | 0.446                       | 0.000                            | 0.000                             | 70               | 38              |
| 11          | 0.196                          | 24                    | 0.047                         | 0.064                   | 0.148                        |                            | 0.247                       | -0.001                           | 0.078                             | 70               | 44              |
| 12          | 0.147                          | 81                    | 0.119                         | 0.092                   | 0.028                        |                            | 0.047                       | -0.002                           | 0.198                             | 70               | 48              |
| 13          | 0.239                          | 100                   | 0.239                         | 0.170                   | 0.000                        |                            | 0.000                       | -0.005                           | 0.398                             | 70               | 43              |
| 14          | 0.315                          | 19                    | 0.061                         | 0.111                   | 0.253                        |                            | 0.432                       | -0.001                           | 0.102                             | 70               | 38              |
| 15          | 0.231                          | 0                     | 0.000                         | 0.056                   | 0.231                        |                            | 0.384                       | 0.000                            | 0.000                             | 70               | 41              |
| 16          | 0.235                          | 0                     | 0.000                         | 0.056                   | 0.235                        |                            | 0.352                       | 0.000                            | 0.000                             | 70               | 41              |
| 17          | 0.197                          | 0                     | 0.000                         | 0.051                   | 0.197                        |                            | 0.338                       | 0.000                            | 0.000                             | 70               | 43              |
| 18          | 0.203                          | 31                    | 0.062                         | 0.079                   | 0.141                        |                            | 0.234                       | -0.001                           | 0.103                             | 70               | 46              |
| 19          | 0.204                          | 28                    | 0.058                         | 0.079                   | 0.146                        |                            | 0.244                       | -0.001                           | 0.097                             | 70               | 44              |
| 20          | 0.166                          | 75                    | 0.049                         | 0.057                   | 0.117                        |                            | 0.135                       | -0.001                           | 0.093                             | 69               | 47              |
| 21          | 0.185                          | 30                    | 0.049                         | 0.106                   | 0.046                        |                            | 0.076                       | -0.003                           | 0.237                             | 70               | 50              |
| 22          | 0.124                          | 100                   | 0.124                         | 0.088                   | 0.000                        |                            | 0.000                       | -0.032                           | 0.266                             | 72               | 52              |
| 23          | 0.000                          | 0                     | 0.000                         | 0.000                   | 0.000                        |                            | 0.000                       | 0.000                            | 0.000                             | 71               | 65              |
| 24          | 0.000                          | 0                     | 0.000                         | 0.000                   | 0.000                        |                            | 0.000                       | 0.000                            | 0.000                             | 70               | 60              |
| 25          | 0.000                          | 0                     | 0.000                         | 0.000                   | 0.000                        |                            | 0.000                       | 0.000                            | 0.000                             | 71               | 62              |
| 26          | 0.000                          | 0                     | 0.000                         | 0.000                   | 0.000                        |                            | 0.000                       | 0.000                            | 0.000                             | 72               | 63              |
| 27          | 0.000                          | *                     | 0.000                         | *                       | *                            |                            | *                           | *                                | *                                 | *                | *               |
| 28          | 0.000                          | 0                     | 0.000                         | 0.000                   | 0.000                        |                            | 0.000                       | 0.000                            | 0.000                             | 72               | 64              |
| 29          | 0.000                          | 0                     | 0.000                         | 0.000                   | 0.000                        |                            | 0.000                       | 0.000                            | 0.000                             | 72               | 59              |
| 30          | 0.000                          | 0                     | 0.000                         | 0.000                   | 0.000                        |                            | 0.000                       | 0.000                            | 0.000                             | 72               | 65              |
| SUM         | 5.256                          | -                     | 1.072                         | 1.766                   | 4.184                        | N.A.                       | 6.973                       | -0.020                           | 1.787                             | -                | -               |
| AVG         | 0.175                          | 20                    | 0.036                         | 0.059                   | 0.139                        | N.A.                       | 0.232                       | -0.001                           | 0.060                             | 70               | 47              |
| NBS         | Q402                           | N400                  | Q400                          | Q403                    | Q401                         | Q410                       | Q415                        | Q415                             | Q417                              | N406             | N113            |

\* DENOTES UNAVAILABLE DATA.

‡ DENOTES NULL DATA.

N.A. DENOTES NOT APPLICABLE DATA.

# SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

## MONTHLY REPORT SPACE COOLING SUBSYSTEM

SITE: SADDLE HILL TRUST LOT 36, MEDWAY, MA  
REPORT PERIOD: APRIL, 1979

SOLAR/1024-79/04

| DAY<br>OF<br>MON. | SPACE<br>COOLING<br>LOAD<br>MILLION<br>BTU | SOLAR<br>FR. OF<br>LOAD<br>PCT | SOLAR<br>ENERGY<br>USED<br>MILLION<br>BTU | OPER<br>ENERGY<br>MILLION<br>BTU | AUX<br>THERMAL<br>USED<br>MILLION<br>BTU | AUX<br>ELECT<br>FUEL<br>MILLION<br>BTU | AUX<br>FOSSIL<br>FUEL<br>MILLION<br>BTU | ELECT<br>ENERGY<br>SAVINGS<br>MILLION<br>BTU | FOSSIL<br>ENERGY<br>SAVINGS<br>MILLION<br>BTU | BLDG<br>DRY<br>BULB<br>TEMP<br>F | AMB<br>TEMP<br>DEG<br>F |
|-------------------|--|--------------------------------|---|----------------------------------|--|--|---|--|---|----------------------------------|-------------------------|
| 1                 | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 68                               | 44                      |
| 2                 | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 70                               | 38                      |
| 3                 | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 71                               | 41                      |
| 4                 | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 67                               | 40                      |
| 5                 | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 69                               | 40                      |
| 6                 | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 67                               | 38                      |
| 7                 | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 67                               | 35                      |
| 8                 | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 68                               | 38                      |
| 9                 | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 69                               | 34                      |
| 10                | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 70                               | 38                      |
| 11                | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 70                               | 44                      |
| 12                | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 70                               | 43                      |
| 13                | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 70                               | 46                      |
| 14                | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 70                               | 44                      |
| 15                | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 70                               | 48                      |
| 16                | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 70                               | 43                      |
| 17                | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 70                               | 41                      |
| 18                | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 70                               | 43                      |
| 19                | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 70                               | 46                      |
| 20                | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 69                               | 47                      |
| 21                | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 70                               | 50                      |
| 22                | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 72                               | 52                      |
| 23                | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 71                               | 63                      |
| 24                | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 70                               | 60                      |
| 25                | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 71                               | 62                      |
| 26                | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 72                               | 63                      |
| 27                | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 72                               | 64                      |
| 28                | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 72                               | 59                      |
| 29                | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 72                               | 65                      |
| 30                | NOT  | NOT                            | NOT                                       | NOT                              | NOT                                      | NOT                                    | NOT                                     | NOT  | NOT   | 72                               | 65                      |
| SUM               | N.A.                                       | -                              | N.A.                                      | N.A.                             | N.A.                                     | N.A.                                   | N.A.                                    | N.A.   | N.A.  | -                                | -                       |
| AVG               | N.A.                                       | N.A.                           | N.A.                                      | N.A.                             | N.A.                                     | N.A.                                   | N.A.                                    | N.A.   | N.A.  | 70                               | 47                      |
| NBS               | Q502                                       | N500                           | Q500                                      | Q503                             | Q501                                     |  | Q508                                    | Q512   | Q514  | N406                             | N113                    |

\* DENOTES UNAVAILABLE DATA.  
@ DENOTES NULL DATA.  
N.A. DENOTES NOT APPLICABLE DATA.

## SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT  
ENVIRONMENTAL SUMMARY

SITE: SADDLE HILL TRUST LOT 36, MEDWAY, MA  
 REPORT PERIOD: APRIL, 1979  
 SOLAR/1024-79/04

| DAY<br>OF<br>MONTH | TOTAL<br>INSOLATION<br>BTU/SQ.FT | DIFUSE<br>INSOLATION<br>BTU/SQ.FT | AMBIENT<br>TEMPERATURE<br>DEG F | DAYTIME<br>AMBIENT<br>TEMP<br>DEG F | RELATIVE<br>HUMIDITY<br>PERCENT | WIND<br>DIRECTION<br>DEGREES | WIND<br>SPEED<br>M.P.H. |
|--------------------|----------------------------------|-----------------------------------|---------------------------------|-------------------------------------|---------------------------------|------------------------------|-------------------------|
| 1                  | 351                              | N C T                             | 44                              | 45                                  | N O T                           | N O T                        | N O T                   |
| 2                  | 105                              |                                   | 38                              | 38                                  |                                 |                              |                         |
| 3                  | 308                              |                                   | 41                              | 45                                  |                                 |                              |                         |
| 4                  | 950                              |                                   | 40                              | 49                                  |                                 |                              |                         |
| 5                  | 318                              |                                   | 40                              | 42                                  | A P P L Y C A B L E             | A P P L Y C A B L E          | A P P L Y C A B L E     |
| 6                  | 1283                             |                                   | 38                              | 44                                  |                                 |                              |                         |
| 7                  | 1090                             |                                   | 35                              | 38                                  |                                 |                              |                         |
| 8                  | 2293                             |                                   | 38                              | 42                                  |                                 |                              |                         |
| 9                  | 130                              |                                   | 34                              | 34                                  |                                 |                              |                         |
| 10                 | 836                              |                                   | 38                              | 42                                  |                                 |                              |                         |
| 11                 | 2275                             |                                   | 44                              | 52                                  |                                 |                              |                         |
| 12                 | 1943                             |                                   | 48                              | 57                                  |                                 |                              |                         |
| 13                 | 1748                             |                                   | 43                              | 53                                  |                                 |                              |                         |
| 14                 | 236                              |                                   | 38                              | 40                                  |                                 |                              |                         |
| 15                 | 468                              |                                   | 41                              | 45                                  |                                 |                              |                         |
| 16                 | 350                              |                                   | 41                              | 46                                  |                                 |                              |                         |
| 17                 | 1088                             |                                   | 43                              | 52                                  |                                 |                              |                         |
| 18                 | 1604                             |                                   | 46                              | 53                                  |                                 |                              |                         |
| 19                 | 1289                             |                                   | 44                              | 54                                  |                                 |                              |                         |
| 20                 | 1894                             |                                   | 47                              | 59                                  |                                 |                              |                         |
| 21                 | 2116                             |                                   | 50                              | 67                                  |                                 |                              |                         |
| 22                 | 1246                             |                                   | 52                              | 65                                  |                                 |                              |                         |
| 23                 | 2005                             |                                   | 63                              | 71                                  |                                 |                              |                         |
| 24                 | 2037                             |                                   | 60                              | 74                                  |                                 |                              |                         |
| 25                 | 1236                             |                                   | 62                              | 74                                  |                                 |                              |                         |
| 26                 | 1183                             |                                   | 63                              | 73                                  |                                 |                              |                         |
| 27                 | *                                |                                   | *                               | *                                   |                                 |                              |                         |
| 28                 | 1329                             |                                   | 64                              | 73                                  |                                 |                              |                         |
| 29                 | 743                              |                                   | 59                              | 65                                  |                                 |                              |                         |
| 30                 | 1718                             |                                   | 65                              | *                                   |                                 |                              |                         |
| SUM                | 35350                            | N.A.                              | -                               | -                                   | -                               | -                            | -                       |
| AVG                | 1178                             | N.A.                              | 47                              | 52                                  | N.A.                            | N.A.                         | N.A.                    |
| NBS ID             | Q001                             |                                   | N113                            |                                     | N115                            | N114                         |                         |

\* DENOTES UNAVAILABLE DATA.

@ DENOTES NULL DATA.

N.A. DENOTES NOT APPLICABLE DATA.









UNIVERSITY OF FLORIDA



3 1262 09052 6236